

Impact of Data from the National Food and Nutrient Analysis Program on the Reported Composition of Highly Consumed Foods

David B. Haytowitz, M.Sc.,
Pamela R. Pehrsson, Ph.D.,
Joanne M. Holden, M.Sc.

Nutrient Data Laboratory
Beltsville Human Nutrition

Research Center

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Expansion of Composition Databases

**Short Lists of
Foods
& Values**

**Special Interest
Databases**

Literature
Analytical
Reports
Food Industry

FFQ

**Nutrient
Database for
Standard
Reference**

**7200
Foods**

**3000
Foods**

**Survey Nutrient
Database (FNDDS)**

➤ **7000 “Recipe”
Foods reported by
Participants**

➤ **62 Components**

➤ **Yield & Nutrient
Retention Factors**

➤ **All Cells Filled**

NFNAP History

- Started in 1997
 - USDA, ARS, Nutrient Data Lab
 - National Heart Lung and Blood Institute
 - 17 Other NIH Institutes and Offices
- NIH Coordination role assumed by National Cancer Institute, NIH in 2005
- Sampled and analyzed over 1200 food items to date
- Encourage participation by industry groups

National Food and Nutrient Analysis Program (NFNAP): Objectives

- Improve estimates of nutrient means and statistical variability for current food supply
- Expand and update documentation
- Expand numbers of foods and components
- Add greater specificity for foods/nutrients
- Address changes in the food supply
- Support data needs for calculated estimates

NFNAP Aims

- Identify and rank foods and nutrients for analysis
- Evaluate existing data for foods and nutrients
- Develop strategies for sampling
- Process and analyze foods
- Review and disseminate results

Key Foods Process

- Composition and consumption data combined to set priorities for analysis
 - SR16-1
 - NHANES 2001-02
- % contribution of each nutrient by food calculated
- % contribution for each nutrient of public health significance combined to determine “importance” of each food
- List of foods ranked and divided into quartiles

Key Foods: 1st Quartile Foods ¹

- 01079 Milk, 2% milkfat
- 01123 Egg, whole, raw, fresh
- 01077 Milk, whole, 3.25% milkfat
- 09207 Orange juice, canned, unsweetened
- 11124 Carrots, raw
- 02047 Salt, table
- 01085 Milk, nonfat, (fat free or skim)
- 04610 Margarine, regular, stick, composite, 80% fat
- 01046 Cheese food, pasteurized process, american

¹ NHANES 2001-02

Key Foods – Top Mixed Dishes¹

Chicken pieces (breast, wing, leg, thigh and back),
baked, broiled, roasted, fried, or stewed

Pizza, cheese with meat

Pizza, cheese with meat and vegetables

Spaghetti with tomato sauce and meat

Chicken nuggets or patties

Pizza, cheese

Macaroni and cheese

Spaghetti with tomato sauce, meatless

Pizza, cheese with vegetables

¹ NHANES 2001-02

Evaluate Quality of Existing Data

- Status of analytical methods, sampling
- Quality control methods, sample handling
- Number of samples
- Changes in the food product
- Age of the existing data
- USDA data quality evaluation system for selected components

Develop Strategies for Sampling

- Sampling plans
 - Collaboration, National Agricultural Statistics Service
 - Nationally representative, probability proportional to size (US Census 2000)
 - Sampling locations:
 - Retail outlets
 - Fast food restaurants
 - Manufacturing plants (industrial ingredients)
 - USDA Commodity distribution points
 - Specialized sampling plans
 - USDA National Fluoride Database
 - American Indian/Alaska Native Foods Database

Sampling and Preparation

- Sampling
 - Contract for sample pickup in retail outlets, nationwide
 - Cooperative agreement with the Food Analysis Laboratory Control Center (FALCC) at VPI&SU
 - Sample preparation and archiving
 - Analytical quality control (QC)
 - Method Development (Folate, vitamin C)
- Analysis
 - Contracts made with commercial analytical labs for general analysis (proximates, minerals, vitamins, fatty acids, amino acids)

Analysis of Food Samples

- Cooperative agreements with university and government scientists
- Specialized expertise required for new and emerging components
 - Vitamin K – Tufts University
 - Folate, tocopherols/tocotrienols – University of Georgia
 - Choline – University of North Carolina
 - Proanthocyanidins, ORAC – University of Arkansas
 - Fluoride – University of Iowa
 - Fatty acids (incl. Trans Fats) – University of Maryland
 - Carotenoids and flavonoids – Food Composition Lab, USDA, ARS
 - Phytosterols and folate - VPI&SU, FALCC

Review and Dissemination

- Results reviewed by QC panel
- Data migrated to NDL's Nutrient Databank System
- Disseminated in annual releases of USDA National Nutrient Database for Standard Reference (SR)
 - To date, added, updated and expanded over 700 food items
 - Also added or expanded data on vitamin K, individual carotenoids, individual sugars, tocopherols
- Special Interest Databases

Special Interest Databases

- Components
 - Flavonoids (2003, 2006)
 - Proanthocyanidins (2004)
 - Fluoride (2004, 2005)
 - Choline (2004)
 - Isoflavones (1999, under revision)
- Populations
 - American Indian/Alaska Native Foods Database
(to be released in 2006)
 - Hispanic/Latino Foods Database (initiated in 2005)

NFNAP Publications

- Database releases 16
- Published papers 40
- Oral Presentations 38
- Posters 93
- Press Releases 6

Changes in Vitamin A Content



Food	Vitamin A, RAE (SR19)	β -carotene	α -carotene	β -cryptoxanthin	Vitamin A, RAE (SR12)
		(μg/100g)			
Carrots, cooked	860	8332	3776	202	1227
Peppers, red, cooked	275	2235	55	2071	188
Lettuce, iceberg	25	299	4	0	16
Peaches, raw	16	162	0	67	27

Changes in Fat Content (g/100g)



Food	SR19			SR12	% Difference	Change per common measure
	Mean	Lower Bound	Upper Bound	Mean		
Fast food french fries	17.05	16.75	18.49	14.80	13	1 med (134 g) ↑ 3.02
Fast food pizza, pepperoni	11.23	9.93	12.54	9.80	13	1 slice (108 g) ↑ 1.54
Egg yolk, raw	26.54	26.02	27.07	30.87	16	1 large (17 g) ↓ 0.74
Bacon, pan-fried	41.78	39.52	44.04	49.24	18	3 slices (24 g) ↓ 1.79

Changes in Ground Beef Composition

Old Ground beef items (SR14 and earlier)		New ground beef items (SR15 and later)	
Description	Fat (g/100 g)	Description	Fat (g/100 g)
Extra lean	17	70% lean meat	30
Lean	21	75% lean meat	25
Regular	27	80% lean meat	20
		85% lean meat	15
		90% lean meat	10
		95% lean meat	5

All ground beef items are raw

Trans Fatty Acids in Margarine

SR Release	Type	<i>trans</i> fatty acids (g/100 g)
SR15 (2002)	Stick, 80% fat	19.69
Preliminary Data (2006)	Stick, 80% fat	14.7 (11.18 – 18.79)
	Tub, 80% fat	4.52 (0.25 – 13.51)

Summary

- Reasons for changes:
 - Better sampling and analytical methodology
 - Changes in agricultural and manufacturing practices
 - Changes in food formulations
 - Difficult to assign a single reason
- NFNAP confirms many values and expands statistical information about mean values

What's next for NFNAP?

- NFNAP renewed for 5 more years
 - Monitor Key Foods
 - Comprehensive analysis of selected Key Foods
 - Ethnic foods databases
 - Data for new nutrients/bioactive food components
 - Validated ingredient database - dietary supplements
 - Update, revise and expand NDL's Nutrient Database Products (ongoing)
 - Analyze changes and variability in nutrients

Impact

- Revised reporting of nutrients in concert with IOM recommendations
 - Dietary folate equivalents
 - α -tocopherol replacing α -tocopherol equivalents
 - Retinol Activity Equivalents (RAE) replacing Retinol Equivalents (RE)
- DRI reports serve as guidelines for future research and database expansion
- **NFNAP data support:**
 - **Public health and nutrition policies and programs (Dietary Guidelines, DRI, etc.)**
 - **Health and nutrition research (e.g., choline)**
 - **Food industry, labeling**
 - **Consumer needs**

Hamburger/Hot Dog Rolls (100 g)

Nutrient	SR19			SR12	% Difference	Change per 1 roll (43 g)
	Mean	Lower Bound	Upper Bound	Mean		
Protein	9.5	9.232	9.763	8.5	10	↑0.43
Fat	4.33	4.277	4.442	5.1	18	↓0.33
Fiber	2.1	1.724	2.415	2.7	29	↓0.3
Phosphorus	62	60.341	63.159	88	42	↓11
Sodium	479	462.98	495.19	560	17	↓35
Selenium	19.5	17.446	21.554	26.5	36	↓3.0
Folate	111	--	--	95	14	↑7

French Fried Potatoes, Fast Food (100 g)

Nutrient	SR19			SR12	% Difference	Change per 1 med. (134 g)
	Mean	Lower Bound	Upper Bound	Mean		
Protein	3.76	3.557	3.471	4.30	14	↓ 0.72
Fat	17.05	16.78	18.49	14.80	13	↑ 3.02
Iron	1.37	0.665	2.076	0.78	43	↑ 0.79
Zinc	0.73	0.530	0.922	0.47	36	↑ 0.35
Thiamin	0.175	0.160	0.190	0.080	54	↑ 0.127
Folate	30	16.417	43.282	38	27	↓ 11

Milk, Whole, 3.25% Milkfat

Nutrient	SR19			SR12	% Difference	Change per cup (244 g)
	Mean	Lower Bound	Upper Bound	Mean		
Calcium	113	--	--	119	6	↓15
Magnesium	10	9.742	10.527	13	34	↓7
Selenium	3.7	3.277	4.061	2	46	↑4.2
Cholesterol	10	9.158	11.573	14	36	↓10

Tortilla Chips, Plain (100 g)



Nutrient	SR19			SR12	% Difference	Change per 1 oz (28 g)
	Mean	Lower Bound	Upper Bound	Mean		
Protein	7.79	7.610	7.963	7	10	↑0.22
Fat	23.36	21.210	25.513	26.20	13	↓0.80
Calcium	174	160.69	187.91	154	12	↑6
Iron	2.32	2.004	2.628	1.52	34	↑0.23
Magnesium	146	136.06	156.54	88	40	↑16
Sodium	421	370.33	471.15	528	25	↓30
Thiamin	0.015	-0.008	0.38	0.075	400	↓0.017